Question 7

- **a)** 26^8 = 208827064576
- **b)** P(26,8) = 26!/(26-8)! = 62990928000
- **c)** 26^7 = 8031810176
- **d)** Since X is already chosen in the first digit and the letters can't be repeated, the problem is akin to selecting and arranging 7 elements out of a set of 25, or P(25,7) = 25!/(25-7)! = 3315312000

Question 8

Number of permutations between the domain with n elements and codomain m elements is P(m, n), where m>= n. In our case, n = 5, thus:

a) 0 since a one-to-one function is not possible as there are fewer elements in the codomain than in the domain.
b) P(5,5) = 5! = 120
c) P(6,5) = 6!/(6-5)! = 720
d) P(7,5) = 7!/(7-5)! = 2520

Question 9

Step 1: Find total number of possible subsets with 100 elements: 2^100
Step 2: Find number of possible subsets that contain only 1 element: C(100,1) = 100!/1!*(100-1)! = 100
Step 3: Remember to also subtract the case of empty set (1) from the total, as the empty set is a subset of all sets
Step 4: Total possible subsets containing more than 1 element = 2^100 – 100 – 1 = 1267650600228229401496703205275

Question 10

a) Step 1: Find set of possible individuals selected, besides the bride: C(9,5) = 9!/5!*(9-5)!= 126
Step 2: Find number of permutations with 6 people: 6! = 720
Step 3: Total possible permutations: Step 1 * Step 2 = 90720

b) Step 1: Find set of possible individuals selected, besides the couple: C(8,4) = 8!/4!*(8-4)!= 70
Step 2: Find number of permutations with 6 people: 6! = 720
Step 3: Total possible permutations: Step 1 * Step 2 = 50400

c)

i. Method 1:
Step 1: Find set of possible individuals selected, if neither of the couple is selected: C(8,6) = (8!/6!*(8-6)!) = 28

Step 2: Total possible permutations = total possible set if no restrictions are placed - # of permutations if both of the couple are selected - # of permutations if neither of them is selected = P(10,6) – 50400 – P(8,6) = 151200 - 50400 – 20160 = 80640

ii. Method 2 (just because I like doing it for fun):
Step 1: Find set of possible individuals selected, if the bride is selected and the groom is not: C(8,5) = 8!/(5!*(8-5)!) = 56
Step 2: Find number of permutations with 6 people: 6! = 720
Step 3: Total possible permutations if bride is selected and groom is not = Step 1 * Step 2 = 40320
Step 4: Possible permutations if exactly one of the couple is selected = number of permutations if only the bride is selected + number of permutations if only the groom is selected = 2* number of permutations if only the bride is selected = 2*Step 3 = 80640

Question 11

a) Combinations of exactly 3 ones: C(12,3) = 12!/(3!*(12-3)!) = 220
b) # of combinations of no one, 1 one, 2 ones, and 3 ones = C(12,0)+C(12,1)+C(12,2)+C(12,3) = 1+12+66+220=299
c) Number of total possible combinations – number of combinations containing 2 ones – number of combinations containing 1 one - number of combinations containing no one = 2^12 – C(12,2) – C(12,1) – C(12,0) = 4017

Question 12

a) 7! = 5040
b) Total number of possible permutations – number of permutations when E and D are adjacent (meaning, when either “ED” or “DE” appears) = 8! – 2*7! = 40320 – 2*5040 = 30240
c) Add numbers of permutations of “CD” and “DE” and subtract out that of “CDE” to avoid double counting: 2*7! – 6! = 10080 – 720 = 9360